# T E C H N I C A L N O T E S

**U.S. Department of Agriculture**
**Natural Resources Conservation Service**
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## GROUND WATER CONDITIONS IN WESTERN OHIO

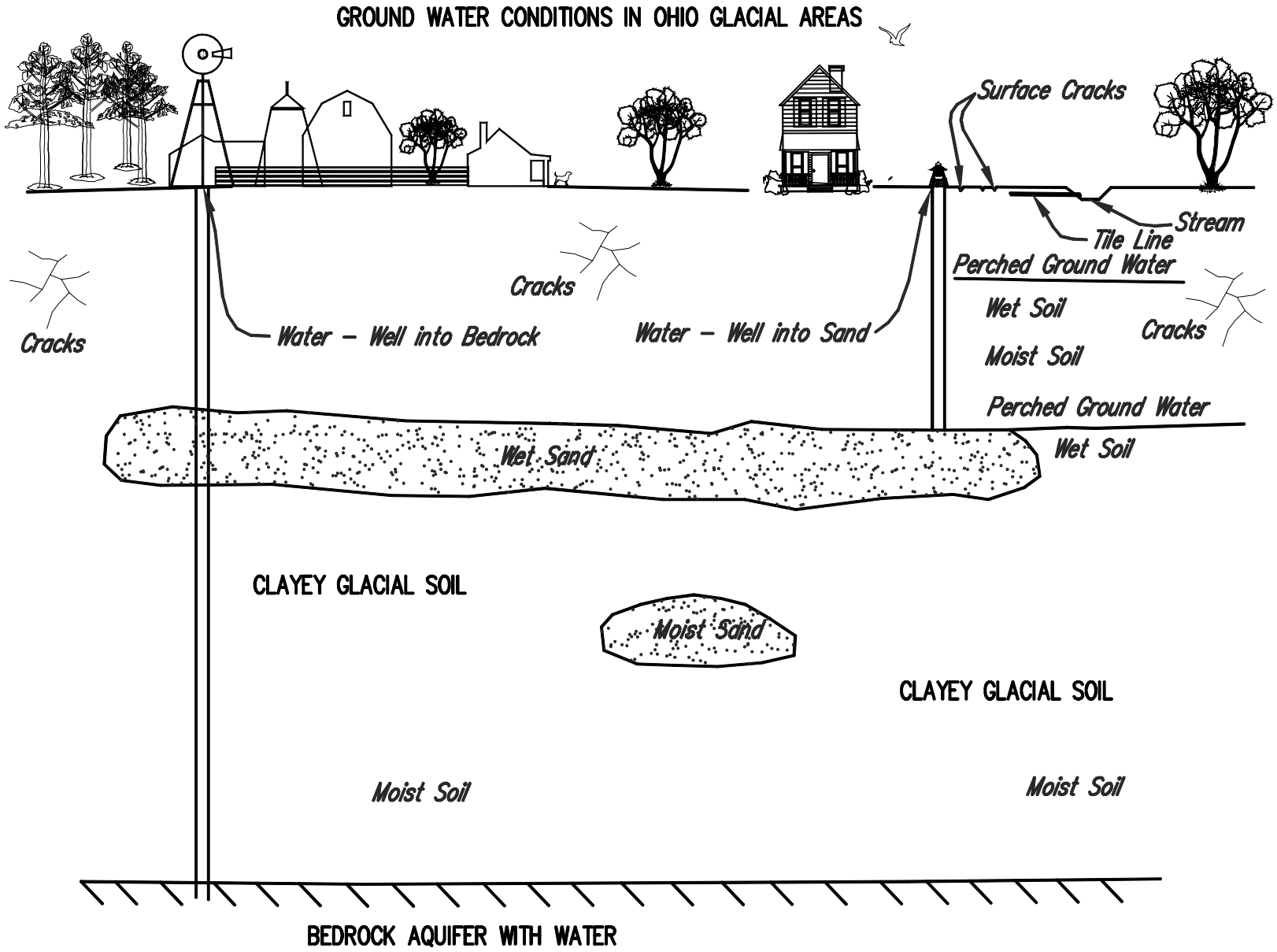
Western Ohio is covered by glacially deposited soils, which are primarily lean clays (CL). Water moves very slowly through clay, and clay therefore does not serve as an aquifer or source of water for homes. In some areas, the clay contains cracks which allow small amounts of water to flow through it but not in a great enough amount to provide enough water to a home. Cracks frequently begin at 10 feet of depth and usually disappear between 15 to 20 feet of depth with uncracked soil below those depths. The surface cracks that form in dry weather (and may convey subsurface water into tile lines) are not related to these deeper cracks.

Scattered through these clayey glacial soils are horizontal layers of silt or lenses of sand and gravel. In some cases, the sand and gravel lenses contain enough water to serve as aquifers for homes with water wells, but only if they lie at a depth of 25 feet or greater. (The State has a minimum depth requirement of 25 feet for water well casings. Old dug wells may be shallower but they do not meet the current state minimum requirements.) Some thick deposits of glacial outwash sands and gravels may fill old preglacial stream valleys and serve as aquifers for cities, such as Dayton, lucky enough to be located near them.

Water that lies below the surface of the ground is known as ground water. Ground water is either found within a "perched" ground water zone or an aquifer. Water contained in cracks in clay or in sands and gravels may constitute "perched" ground water. This water is perched on top of an impermeable layer that prevents water from rapidly moving downward. Perched ground water may occur within a wet sand lens that has collected water from the surrounding clay. An aquifer is soil or rock that is saturated with ground water, and it serves as a source of water for people or animals. The uppermost surface of water in a perched ground water zone or aquifer may lie at slightly different elevations within an area.

Bedrock, which is limestone or dolomite, normally serves as aquifers in western Ohio. Bedrock is rarely exposed at the ground surface in western Ohio, and it can be 50 to over 200 feet below the surface. Rainwater percolates downward through the soil and is the water source for an aquifer, but the catchment area for the rain may be ten or more miles from a well that taps into the aquifer. It takes decades to hundreds of years for water to move through soil into deep bedrock aquifers. Where bedrock is exposed in rock quarries and streams, it may serve as a direct entrance for water to move into an aquifer, but these places are limited in area.

Laboratory tests have been made on clay soil in many areas in western Ohio. The tests show that water normally moves (its permeability rate) at a speed of 0.1 foot per year, but it can be as slow as 0.01 foot per year. Using seepage analysis equations for animal waste sites plus laboratory test results, a time of 200 years is estimated for water to move from the ground surface to the top of an aquifer at a depth of 100 feet.


GROUND WATER CONDITIONS IN OHIO GLACIAL AREAS
Surface Cracks
Stream
Tile Line
Perched Ground Water
Wet Soil
Moist Soil
Perched Ground Water
Wet Soil
Cracks
Cracks
Cracks
Water – Well into Bedrock
Water – Well into Sand
Wet Sand
CLAYEY GLACIAL SOIL
Moist Sand
CLAYEY GLACIAL SOIL
Moist Soil
Moist Soil
BEDROCK AQUIFER WITH WATER